

**REMARKS**

Claims 1-21 and 31-42 are currently pending in this application. Claim 41 has been amended to correct an obvious typographical error. Applicant requests reconsideration of the application, with no further amendments to the claims, except claim 41, in view of the remarks set forth below.

Paragraph 9 (page 13) of the FOA objects to claims 4-12, 16-21 and 37 and indicates that they would be allowable if rewritten to overcome the objection set forth in the FOA and to include all of the limitation of the base claim and any intervening claims. Applicant appreciate the indication of allowability of claims 4-12, 16-21 and 37.

Paragraph 6 of the Final Office Action (FOA) rejects claims 1-3, 13-15 and 31-35 under 35 U.S.C. §103(a) as being unpatentable over Thyagarajan (U.S. Patent Publication No. 2004/10096111 A1) in view of Frishman et al. (U.S. Patent Publication No. 2003/0044080 A1). Paragraph 7 of the FOA rejects claim 36 under 35 U.S.C. §103(a) as being unpatentable over Thyagarajan in view of Frishman et al., Tan et al. (US 6,188,799 B1) and Varma et al. (US 2003/0235250 A1). Paragraph 8 of the FOA rejects claim 40 under 35 U.S.C. §103(a) as being unpatentable over Thyagarajan '111 in view of Frishman et al. and Thyagarajan. Paragraph 9 (page 11) of the FOA rejects claims 41-42 under 35 U.S.C. §103(a) as being unpatentable over Thyagarajan '111 in view of Frishman et al. and Tan et al.

Applicant respectfully traverses the prior art rejections of claims 1-3, 13-15, 31-36 and 40-42. The applied references fail to disclose or suggest the inventions defined by claims 1-3, 13-15, 31-36 and 40-42, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention. Applicant therefore requests reconsideration of the application without further amendment to claims 1-3, 13-15, 31-36 and 40-42 (except for the minor amendment to claim 41 to correct an obvious typographical error) as set forth below.

**Traversal of Prior Art Rejections****Claims 1-3, 13-15, 31-35**

Paragraph 6 of the FOA rejects claims 1-3, 13-15 and 31-35 under 35 U.S.C. §103(a), as being unpatentable over Thyagarajan '111 in view of Frishman. Applicant respectfully traverses this rejection.

Independent claim 1 is directed to a method of processing images compressed using block based compression and recites:

- determining whether two blocks are neighboring blocks;
- determining whether the two neighboring blocks are both subdivided, if it is determined that the two blocks are neighboring blocks; and
- performing deblocking filtering on one or more edge pixels of the two neighboring blocks, after determining that both of the two neighboring blocks are not subdivided.

With reference to an embodiment shown in the drawings of the present application, for example, an image decompressor 200 comprises a deblocking filter module 240 to filter block edges when necessary and a processor 250 to control the deblocking filter module 240. The decompressor 200, VLD module 210 decompresses compressed image information, quantization module 220 inverse quantizes the decompressed image information and inverse VBSDCT module 230 converts the inverse quantized image information from frequency to spatial domain, using the block size assignment information. Processor 250 determines whether two blocks of the image are neighboring blocks as shown in FIG. 5. Processor 250 then determines whether deblocking is necessary for the two neighboring blocks based on the amount of block edge activity or busyness. If deblocking is deemed necessary, one or more common edge pixels of the two neighboring blocks are filtered by deblocking filter module 240. The post-processed image information is then output to a display and/or stored for presentation.

With reference to at least FIG. 6, in process 600, a determination is made whether two neighboring blocks are both subdivided (610). Here, the block size assignment (BSA) information may be used to determine whether the two neighboring blocks are subdivided. If both of the two neighboring blocks are not subdivided, then deblocking filter is used on one or more edge pixels of the two neighboring blocks (620).

Returning now to the FOA, the FOA characterizes Thyagarajan '111 as determining whether two blocks are neighboring blocks and determining whether the two neighboring blocks are both subdivided. Applicant observes that Thyagarajan '111's invention relates to "a compression scheme utilizing adaptively sized blocks of pixels based on the local contrast ratio," (para. 0003 Thyagarajan '111) which takes place in the encoder. At block 472 in FIG. 2b, sub-blocks are determined. More specifically, at paragraph [0041] of Thyagarajan '111, "once the

local contrast ratio is determined, the variance threshold corresponding to the contrast ratio is determined 468. Thus, if the local contrast ratio falls within a given range, a particular variance threshold is assigned. Upon determining the variance threshold corresponding to a given contrast ratio, the block size assignment is determined 472.” Hence, Thyagarajan ‘111 does not teach “*determining whether the two neighboring blocks are both subdivided.*” (Emphasis added). Instead, Thyagarajan ‘111 teaches determining a block size assignment in which to subdivide blocks in the encoder. In Thyagarajan ‘111, the “local contrast ratio is used as a criterion for subdividing.” (para. [0014] Emphasis added). In paragraph [0032] of Thyagarajan ‘111, “the encoder 102 comprises a block size assignment element 108, which performs block size assignment in preparation for video compression.” (Emphasis added).

In view of the explicit teachings of Thyagarajan ‘111, there is no determination “*whether the two neighboring blocks are both subdivided*,” as recited in claim 1. More importantly, there is no such determination for the purpose of performing deblocking filtering.

The FOA states that “Thyagarajan does not teach performing deblocking filtering on one or more edge pixels of two neighboring blocks, after determining that both of the two neighboring blocks are not subdivided.” Applicant observes that Thyagarajan ‘111 does not teach deblocking filtering at all. Thyagarajan ‘111 is essentially silent to any details of deblocking filtering in the decoder and, particularly, to criteria for performing deblocking filtering.

The FOA characterizes Frishman as performing deblocking filtering on one or more edge pixels of the two neighboring blocks, after determining that both of the two neighboring blocks are not of a particular boundary classification (“Non Blocking” or “Blocky”). In the rejection, the FOA modifies Thyagarajan ‘111 with the deblocking filtering of Frishman.

However, Frishman states in paragraph [0042]

[T]he definition is such that the ROI will contain a blocky boundary and a smooth set of pixels on each side of the block boundary, and will not include edges. Once the filtered pixels ROI is defined, a unique rule provides a method for choosing a filter to be used in filtering stage 156. ROI definition stage 152 is performed for every pixel-duo residing across a boundary classified as blocky in stage 150. (Emphasis added)

Hence, Frishman teaches away from Applicant's claimed invention of "performing deblocking filtering on one or more edge pixels of the two neighboring blocks, after determining that both of the two neighboring blocks are not subdivided," as recited in claim 1. (Emphasis added) In the claimed invention, if an edge is determined to be filtered, the pixels around this edge are NOT typically smooth. Therefore, the combined teachings of Frishman and Thyagarajan '111 does not lead to the claimed invention because Frishman does not intend to filter edges.

Furthermore, Applicant observes that the combination of Thyagarajan '111 in view of Frishman does not teach the claimed invention as recognized in the FOA at page 4, line 17+. Thus, the FOA further modifies the combination of Thyagarajan '111 in view of Frishman in an attempt to meet Applicant's claimed invention. However, the deblocking in Frishman takes place in the decoder. However, the determination operation (steps) of Thyagarajan '111 relied upon in the rejection takes place in the encoder and is not related to any determination for filtering purposes in the decoder.

In Frishman the classification is a function of a block boundary classification. If the Pixels  $P_8$  and  $P_9$  are Non-Blocky there is "No filtering" (See FIG. 6). Frishman does not mention subdividing or a determination of subdividing. Applicant also observes that in the Examiner's characterization of Frishman, Frishman determines whether to perform deblocking filtering based on one criterion, a block boundary classification. Not only do Thyagarajan'111 and Frishman fail to teach two different determinations to determine whether to filter or not, Thyagarajan '111 and Frishman also fail to teach the same criteria used by Applicant.

As can be readily seen, Frishman does not teach 1) deblocking filtering of "edge pixels" (or edges); and 2) deblocking filtering when the blocks "are not subdivided." Thus, Frishman cannot be relied upon for deblocking filtering in the manner as claimed by Applicant. Furthermore, any additional modifications to the combination of Thyagarajan '111 and Frishman would destroy the intended operation thereof derived from such a combination since Frishman does not filter edges. Accordingly, the combined teachings of Thyagarajan '111 and Frishman do not lead to the invention recited in independent claim 1.

Independent claims 13, 31 and 34 contain similar language. Thus, the remarks set forth above in relation to claim 1 equally apply to independent claims 13, 31 and 34.

Claims 2-12 depend directly or indirectly from independent claim 1; claims 14-21 depend directly or indirectly from claim 13; claims 32-33 depend directly or indirectly from claim 31;

and claims 35-42 depend directly or indirectly from claim 34. Therefore, the combination of Thyagarajan '111 and Frishman fails to disclose or suggest at least one element of each of the dependent claims 2-12, 14-21, 32-33 and 35-42 at least by virtue of their dependency from claims 1, 13, 31 and 34.

Furthermore, Applicant believes that many of the dependent claims 2-12, 14-21, 32-33 and 35-42 recite features that are clearly lacking from the applied references, and do not acquiesce to any of the rejections.

In view of the foregoing, Applicant respectfully requests that the rejection of claims 1-3, 13-15 and 31-35 under 35 U.S.C 103(a) as being unpatentable over Thyagarajan '111 in view of Frishman be withdrawn.

### **Claim 36**

Paragraph 7 of the FOA rejects claim 36 under 35 U.S.C. §103(a) as being unpatentable over Thyagarajan '111 in view of Frishman, Tan et al. and Varma et al. Applicant respectfully traverses this rejection.

The combination of Thyagarajan '111 in view of Frishman does not disclose or suggest the subject matter recited in independent claim 34 as set forth above for the rejection of claims 1-3, 13-15 and 31-35 under 35 U.S.C 103(a) as being unpatentable over Thyagarajan '111 in view of Frishman. Claim 36 depends on and contains all of the limitations of independent claim 34 and, therefore, distinguishes from the references at least in the same manner as claim 34.

The references to Tan and Varma are not relied upon for any of the deficiencies in the combination of Thyagarajan '111 in view of Frishman asserted by Applicant above. Accordingly, Tan and Varma do not cure the deficiencies of Thyagarajan '111 as modified by Frishman, and one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

Accordingly, Applicant respectfully requests that the prior art rejection of claim 36 be withdrawn.

### **Claim 40**

Paragraph 8 of the FOA rejects claim 40 under 35 U.S.C. §103(a) as being unpatentable over Thyagarajan '111 in view of Frishman and Thyagarajan. Applicant respectfully traverses this rejection.

The combination of Thyagarajan '111 in view of Frishman does not disclose or suggest the subject matter recited in independent claim 34 as set forth above for the rejection of claims 1-3, 13-15 and 31-35 under 35 U.S.C 103(a) as being unpatentable over Thyagarajan '111 in view of Frishman. Claim 40 depends on and contains all of the limitations of independent claim 34 and, therefore, distinguishes from the references at least in the same manner as claim 34.

The reference Thyagarajan has not been relied upon for any of the deficiencies in the combination of Thyagarajan '111 in view of Frishman asserted by Applicant above. Accordingly, Thyagarajan does not cure the deficiencies of Thyagarajan '111 as modified by Frishman, and one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

Accordingly, Applicant respectfully requests that the prior art rejection of claim 40 be withdrawn.

Paragraph 9 of the FOA rejects claim 41-42 under 35 U.S.C. §103(a) as being unpatentable over Thyagarajan '111 in view of Frishman, and Tan et al. Applicant respectfully traverses this rejection.

The combination of Thyagarajan '111 in view of Frishman does not disclose or suggest the subject matter recited in independent claim 34 as set forth above for the rejection of claims 1-3, 13-15 and 31-35 under 35 U.S.C 103(a) as being unpatentable over Thyagarajan '111 in view of Frishman. Claims 41-42 depend on and contain all of the limitations of independent claim 34 and, therefore, distinguish from the references at least in the same manner as claim 34.

The reference Tan et. al. has not been relied upon for any of the deficiencies in the combination of Thyagarajan '111 in view of Frishman asserted by Applicant above. Accordingly, Tan et al. do not cure the deficiencies of Thyagarajan '111 as modified by Frishman, and one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

Accordingly, Applicant respectfully requests that the prior art rejection of claims 41-42 be withdrawn.

**Conclusion**

In view of the foregoing amendments and discussion, Applicant respectfully submits that all claims in this application are in condition for allowance. Applicants respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number **17-0026**. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Respectfully submitted,

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